

ABSTRACT OF THE DISCLOSURE

A thermoelectric device with an improved figure-of-merit achieved by lowering the thermal conductivity of the thermoelectric device without significantly reducing electrical conductivity. The reduction in value of thermal conductivity is achieved by reducing the phonon thermal conductivity λ_p without significantly affecting the electron thermal conductivity λ_e . The reduction in phonon thermal conductivity λ_p is accomplished in two steps: First the phonon conduction is decoupled and separated from the electron conduction by the use of an ultra-thin film semiconductor thermoelement. And second, the phonon conduction is selectively attenuated by the use of phonon-blocking structures without affecting the electron conduction. Methods for fabrication of the thermoelectric devices are also provided.